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TITLE: BUILDING PANELS

ABSTRACT:

A building panel (10,110) has a foam substrate (11,111) and a coating or cover layer (12,112). Expanded mesh material (13,113) is bonded to the substrate (11,111) by a bonding layer (14,114) to improve the strength of the panel(10,110). The expanded mesh material (13,113) may be planar or undulating and the bonding layer (14,114) may be a foaming glue.

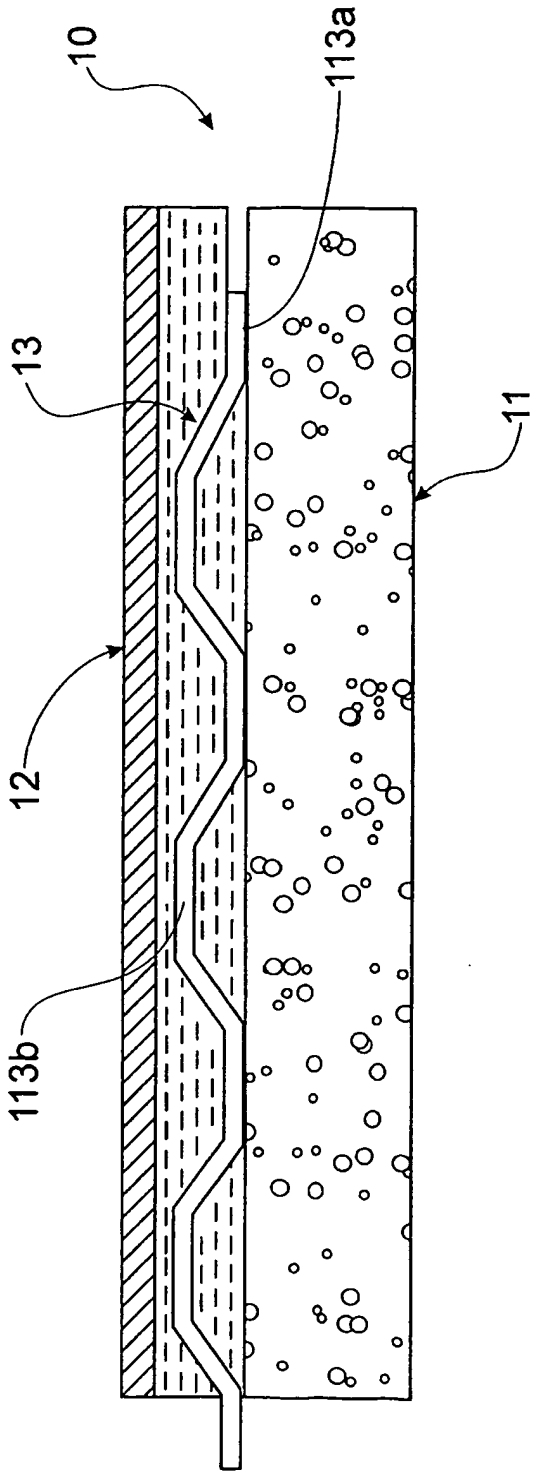

FIG. 3

P/00/011
Regulation 3.2

AUSTRALIA

Patents Act 1990

ORIGINAL
COMPLETE SPECIFICATION
STANDARD PATENT

Invention Title: "BUILDING PANELS"

The following statement is a full description of this invention, including the best method of performing it known to us:

TITLE

BUILDING PANELS

THIS INVENTION relates to building panels, which may be of the type used in cladding the exterior of buildings.

In particular, the invention relates to panels that utilise a substrate that holds or supports a coating or layer of material that is chosen for its inherent properties that are useful at an exposed face or surface area of a building or the like, either externally or internally.

Various prefabricated panels are known in the building art to cover or clad buildings and the like, especially to achieve a particular surface effect, a visual appearance, texture, and/or weather proofing. Such known panels may comprise a substrate to which is laminated such other material as is required to achieve the desired effect. A common panel substrate is an expanded foam panel. Such panel material is commonly laminated with thermally reflective sheet material, such as aluminium based sheet, the sheet material being adhered thereto. These known panels are often used for their thermal properties. They may have other, externally applied decorative materials or treatments, added or applied to the resulting composite panel, substrate and coating, to suit a particular application.

Decorative surfaces applied to building panels of the above general kind can involve a range of materials, applied by a

variety of processes. The major problem with this approach to achieving a desired appearance to a building is a need to bring into effect a coating that stays adhered to its substrate over a long period under changing environmental influences. Considerable effort has been devoted in the past to the selection of both the substrates and the coatings. Often an intervening bond layer or treatment is added so as to create an adequate or useful surface effect or bond between a chosen substrate and a coating to effect a stable assembly over a long term.

A foam substrate is readily achieved or obtained from standard sources at relatively low cost and with advantage of minimal weight and consequent minimal difficulty in transport and handling. Such foam substrates do not have, as an inherent property, the ability to readily resist impacts unscathed. Their other properties outweigh this disadvantage in most applications. Any surface treatment that is added may additionally result in improved rigidity in the resulting assembly. However, where the coating is one that, for example, is brittle, a foam substrate adds little, if zero, support to the coating in the event of an impact with the panel.

An object of the present invention is the provision of improvements in building panels wherein the application of coatings to substrates is effected with consequent better retention of the coating and/or better impact resistance in the coating.

The invention achieves its object in the provision of a building panel comprising a substrate and a coating applied to the substrate, the substrate and coating being both contacted with an interposed mesh-like material. The interposed mesh is advantageously an expanded metal mesh of the kind that is known in the art, produced from sheet metal by slotting and extending to open the mesh. Other mesh materials might be used. A suitable mesh will be one that effects better strength and/or impact resistance to a coating and/or better assists retention of the coating on the substrate. Preferably the mesh material provides all of better strength, impact resistance and retention of the coating.

The substrate of the invention is ideally an expanded foam as is commonly produced from a range of plastic materials in a range of sheet dimensions, including a range of thicknesses. Its thickness in the present invention might be chosen with selected thermal properties in mind. It might be an expanded foam with other additional surface treatments such as application of reflective foil, typically on the reverse. It might be produced from fire resistant foams. The foams may be formed as slabs with any of the known foam slab forming techniques. It may be laminated as a composite of a plurality of a variety of layers of other standard sheet materials.

The surface coating may ideally be an acrylic bonded mineral based material as is known in the art. It might be a concrete

composition, particularly the light weight form. The surface coating is ideally screeded or otherwise applied in manner to effect a desired surface texture or appearance. It might be sprayed.

Adhesion of the surface coating might be enhanced by use of an intervening adhesion enhancing treatment or bond layer. The chemistry of such intervening layers or treatments and their manner of application is known to those skilled in the art and a selection of one of them will depend on the properties of the materials forming the adjoining surfaces.

Alternatively, the adhesion may be effected by a bond layer comprising foaming glue, eg. a polyurethane, which enters the interstices between the beads in the substrate, and passing through the expanded metal mesh, to provide a strong bond therebetween.

As stated above, the mesh-like material is ideally an expanded metal mesh such as is routinely produced from sheets of steel, aluminium, and the like. These meshes offer quite sharp geometric features, with capacity to effect generation of a variety of opening sizes in the mesh and thicknesses to the resulting sheet-like product. Ideally, the dimensions of the mesh and the nature of the metal is chosen with the degree of durability required in the final product as well as the qualities of the surface coating and/or bond layer in mind. Cost may also be a factor in so far as the added layers may need to fill out the mesh-like material to a smoother surface (as

described in greater detail below). Ideally the nature of the mesh-like material is chosen so as to realise a reliable keying of the coating into the mesh-like material.

The building panel of the invention ideally puts the mesh-like material and the substrate together as a unitary, prefabricated construction. The mesh-like material is advantageously fixed to a substrate face in a prefabrication step, which aims at fixing the two together in a manner effective to hold the mesh-like material in close contact and preferably locked contact with the substrate.

A layer of adhesive might be applied to a surface of the substrate and the mesh-like material might be bonded by it to the substrate. An intimate fixing of mesh to substrate may be achieved by means of a subsequent surface layering process that layers over the mesh and exposed substrate surface, as opposed to say applying an adhesive to the substrate and more simply pressing the two together.

An expanded mesh may be laid over a substrate and the two can be fixed together by a sprayed layer. Alternately, a vacuum sealed and heat bonded sheet may be used, overlying the two. (The sealed sheet is best applied with any air between being expelled by evacuation as is known in the art of vacuum lamination and heating of the sheet may be achieved in the usual manner with the sheet collapsed into close contact with mesh and substrate by the

evacuation process.) By the foregoing there is effected a close clamping of the mesh to the substrate, the applied layer enclosing the mesh and attaching to the substrate over a substantial area through the pores in the mesh. A useful result may be achieved by spraying a coating over the two, effective to dry over all of the exposed surfaces of both mesh and substrate with a good bond to both surfaces.

The expanded metal mesh may be substantially planar or "undulating", where the "valleys" are in contact with the substrate, and the "peaks" are spaced therefrom.

The mesh (and the bond layer and/or cover layer) may be rebated on at least one side of the panel, and extend from at least one other side thereof, to enable adjacent such panels to be interlocked.

The invention will now be described with reference to preferred embodiments as shown in the accompanying drawings in which:

FIG. 1 is a transverse sectional view of a panel in accordance with a first embodiment of the invention;

FIG. 2 is a perspective view of a panel with incomplete sections showing underlying layers in accordance with the invention; and

FIG. 3 is a transverse sectional view of a second embodiment.

In FIG. 1 is shown a building panel 10 formed with a

substrate 11 with a coating 12. The substrate 11 is ideally an expanded foam, as is outlined above. The coating 12 is ideally chosen for its decorative, wearing, weathering, and/or other desired properties. On substrate 11 is mounted an expanded metal mesh 13 as is outlined above. A bond layer 14 is applied so as to provide a base for coating 12 as is described herein above and will be clear to those skilled in the art. The bond layer might be conveniently screeded into place. Alternately the bond layer might be thinner and the coating might be screeded. The expanded metal mesh 13 has an advantageous effect in that it provides a useful depth control to screeded material in so far as trowelling is facilitated with the outer surface of the mesh being uniformly raised above the surface of the substrate.

In FIG. 2 is shown a corner of a building panel in accordance with the present invention of the kind seen in FIG. 1. The substrate 11 is overlaid or fitted with or bonded to an expanded metal mesh 13 which may face the substrate up to a suitable margin as indicated. The bond layer 14 might be screeded over mesh 13. Coating 12 might then be applied. The bond layer and coating ideally extend around the edges of the panel to achieve a better external effect. However, there may be circumstances where it is desired to not coat closely up to and/or around the edges of the substrate, and the panels produced for these circumstances are envisaged as

remaining within the scope of the invention.

Referring to the second embodiment of FIG. 3, the panel 110 has a foam substrate 111 as hereinbefore described.

The expanded metal mesh 113 is "undulating" where the "valleys" 113a lie on the substrate 111, and the "peaks" 113b are spaced a small distance above the substrate 111.

The bond layer 114 is a foaming glue, eg. a polyurethane of the type sold under the Trade Mark 'PERBOND' by Boat Craft Pacific, Loganholme, Queensland, Australia. This material has the advantage that it foams through the expanded steel mesh 113 and into the interstices between the beads in the substrate to form a stronger bond than is possible with a surface contact glue.

As shown, the expanded steel mesh 113 can be rebated on two sides of the panel 110, and extend from the other two sides of the panel 110, to allow adjacent panels to "interlock". (The cover layer 112 and bonding layer 114 can also be rebated/extended accordingly.)

It will be clear to those skilled in the art that the basic combination of substrate and mesh achieves a useful effect or treatment to a surface of the substrate, at which to apply one or more coatings, decorative coating, bond layer plus decorative coating, and patterned arrays of decorative coatings. The combination allows adoption of more common substrate materials

whilst effecting improvement in the resulting building panel.

It will be clear to those skilled in the art that the properties of the mesh can be tailored to achieve a desired outcome. The stronger the mesh, the more resistant will the panel be to knocks or impacts that might fracture a more simple foam based panel. The deeper the mesh over the substrate, the more effective the keying of the coating or coatings. The more open the mesh, the lighter will be the panel. The respective criteria will be determined by the application and the chosen materials.

It will be clear to those skilled in the art that the panel might be mounted in place using any of the standard techniques known in the art that have been derived for the chosen substrate. Thus, a foam substrate might be conveniently held in place by a contact adhesive.

The claims defining the invention are as follows:

1. A building panel comprising a substrate and a coating applied to the substrate, the substrate and coating being both contacted with an interposed mesh-like material.

2. A panel as claimed in claim 1, wherein:

the interposed mesh material is an expanded metal mesh, the mesh material increasing the strength, impact resistance, and retention of the coating.

3. A panel as claimed in claim 1 or claim 2, wherein:

the substrate of the invention is an expanded foam, which is optionally fire resistant, and optionally laminated as a composite of a plurality of a variety of layers.

4. A panel as claimed in any one of claims 1 to 3, wherein:

the surface coating is an acrylic bonded mineral based material or a concrete composition, optionally a light weight form.

5. A panel as claimed in any one of claims 1 to 4, wherein:

adhesion of the surface coating is enhanced by use of an intervening adhesion enhancing treatment or bond layer.

6. A panel as claimed in any one of claims 1 to 5, wherein:

the adhesion of the surface coating is effected by a bond layer comprising foaming glue, eg. a polyurethane, which enters the interstices between the beads in the substrate, and passing through the expanded metal mesh

7. A panel as claimed in any one of claims 1 to 6, wherein:

the expanded metal mesh is substantially planar or "undulating", where the "valleys" are in contact with the substrate, and the "peaks" are spaced therefrom.

8. A panel as claimed n any one of claims 1 to 7, wherein:

the expanded metal mesh (and the bond layer and/or cover layer) are rebated on at least one side of the panel, and extend from at least one other side thereof, to enable adjacent such panels to be interlocked.

9. A building panel substantially as hereinbefore described with reference to FIGS. 1 and 2, or FIG. 3, of the accompanying drawings.

10. A method of manufacturing a building panel including the steps of:

applying a mesh-like material to a substrate; and

enclosing the mesh-like material with a coating.

11. A method as claimed in claim 10, wherein:

the mesh-like material is adhered or bonded to the substrate by a bond layer.

12. A method as claimed in claim 11, wherein:

the substrate is an expanded plastics foam;

the mesh-like material is an expanded mesh material which is undulating, with "valleys" in contact with the substrate, and "peaks" spaced above the substrate; and

the bonding layer is a foaming glue which enters interstices between beads in the foam substrate, and passes through the expanded mesh material.

13. A method substantially as hereinbefore described with reference to FIGS. 1 and 2, or FIG. 3, of the accompanying drawings.

DATED this First day of December 2000.

JBS PATENTS PTY LTD

By its Patent Attorneys

FISHER ADAMS KELLY

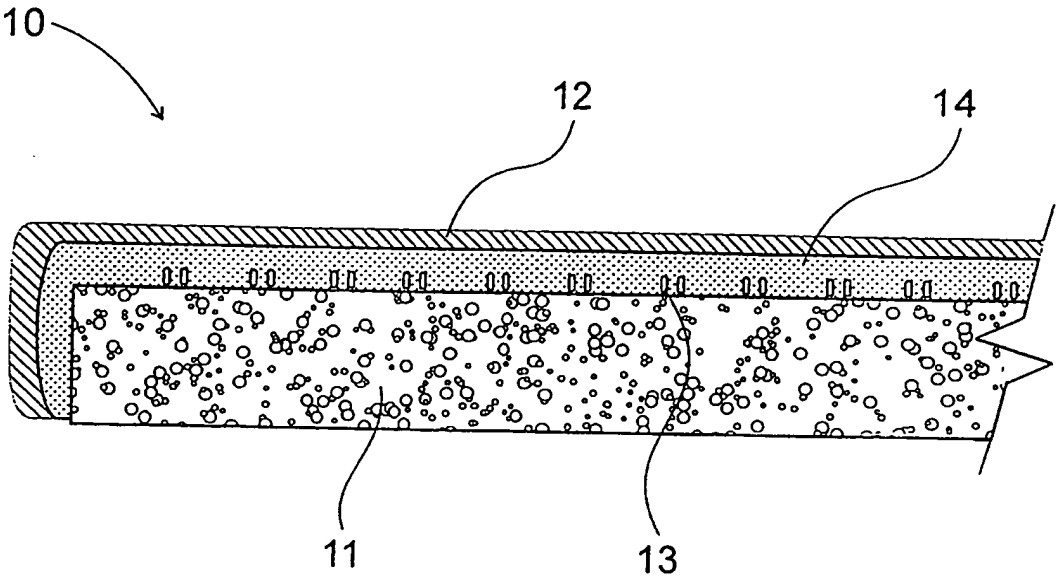

FIG. 1

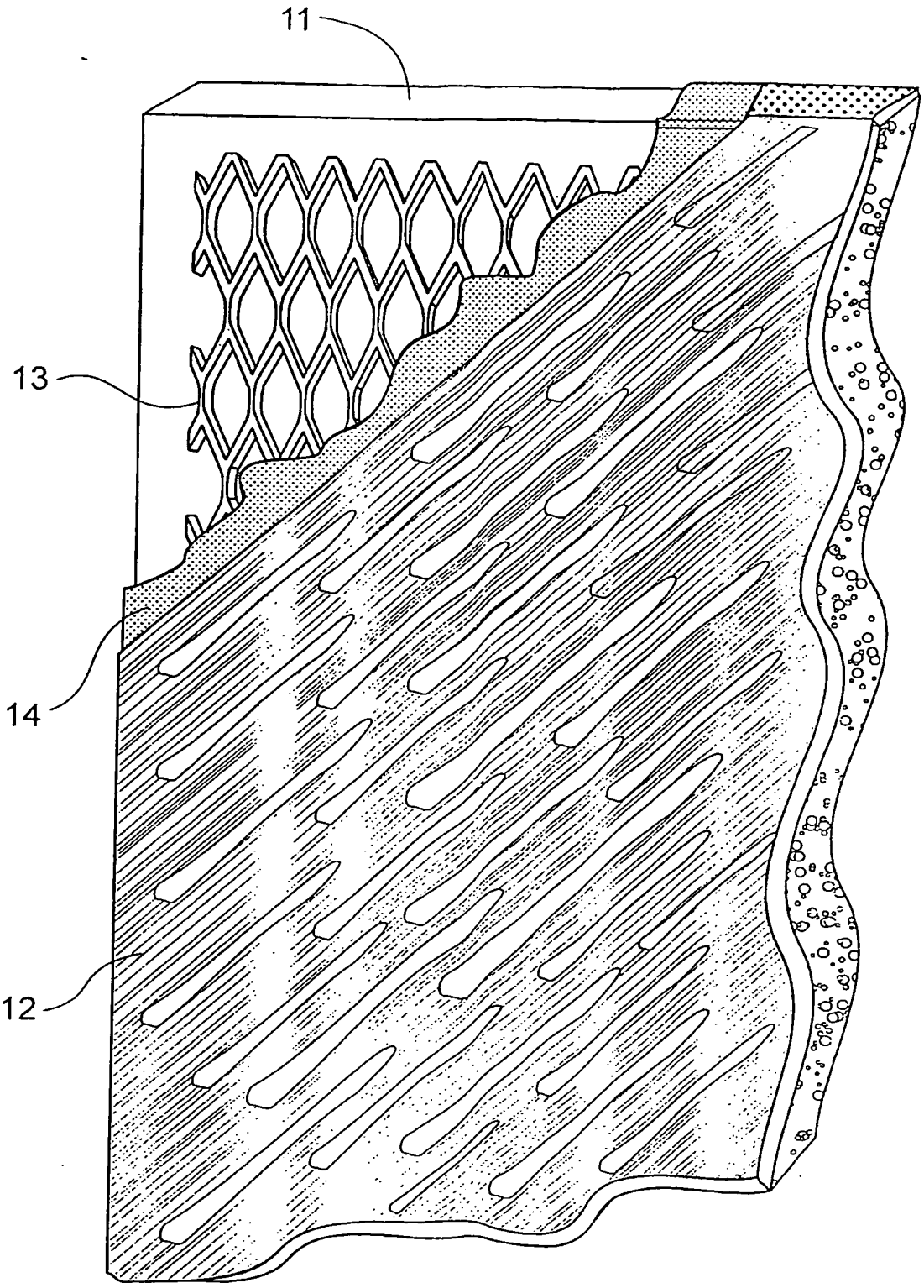

FIG. 2

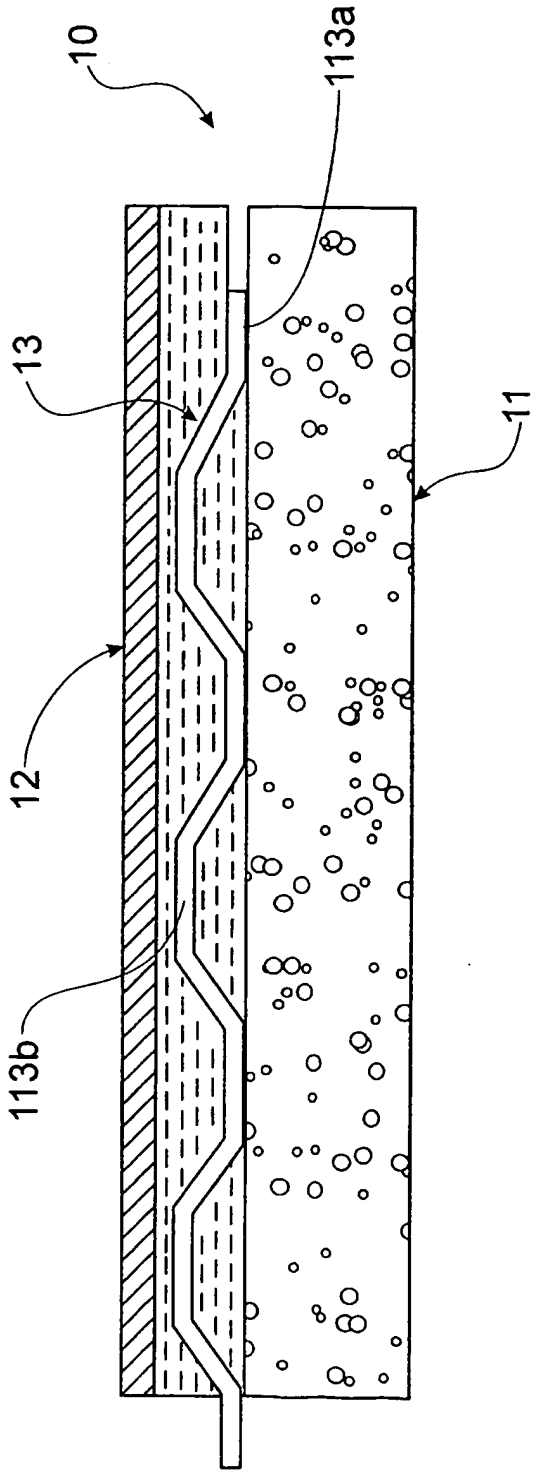

FIG. 3